Claims

What is claimed is:

1. A method for providing multicast transmissions using a distributed router, the method comprises the steps of:

a) determining, for a source virtual subnetwork, a list of downstream virtual subnetworks for multicast traffic based on multicast routing protocol;

b) determining multicast group membership on a per downstream virtual subnetwork, edge device, and port basis;

c) receiving a packet via the source virtual subnetwork;

d) upon receiving the packet, generating a multicast session table entry based on the list of downstream virtual subnetworks and the multicast group membership;

e) establishing virtual connections between the source virtual subnetwork and edge devices coupled to virtual subnetworks identified in the list of downstream virtual subnetworks; and

f) downloading the multicast session table entry to the edge devices.

2. The method of claim 1, wherein step (d) further comprises:

generating the multicast session table entry to include ports of the edge devices that are coupled to at least one of: a legacy router and a host.

3. The method of claim 1, wherein step (a) further comprises:

receiving a routing protocol message from a router associated with one of a plurality of virtual subnetworks, wherein the plurality of virtual subnetworks includes the source virtual subnetworks and the destination virtual subnetworks;

interpreting the routing protocol message to determine ports of the edge devices coupled to downstream routers;

sending, via the ports, routing protocol messages to the downstream routers.

4. The method of claim 1, wherein step (b) further comprises:

providing a membership query on a virtual subnetwork;

receiving, via a port of one of the edge devices, a report in response to the membership query; and

suppressing forwarding of the report to other ports of the virtual subnetwork.

5. The method of claim 1 further comprises:

receiving a leave message via a port of one of the edge devices, wherein the leave message indicates that a member desires to leave a multicast group;

providing a group specific membership query to the port of the one of the edge devices; and

when a report is received in response to the group specific membership query, maintaining the port of the one of the edge devices within the multicast group membership.

6. The method of claim 5 further comprises:

when a report is not received in response to the group specific membership query, determining whether at least one other port of a virtual subnetwork is supporting the multicast group; and

when there are no other ports of the virtual network supporting the multicast group, providing a leave message to a legacy router having query responsibilities.

7. The method of claim 1 further comprises:

receiving a leave message (IGMP) via a port of one of the edge devices; and

switching group affiliation of the port of the one of the edge devices in accordance with the leave message.

8. The method of claim 1, wherein step (b) further comprises:

receiving a query from a legacy router;

forwarding the query to a plurality of virtual subnetworks, wherein the edge devices support the plurality of virtual of subnetworks via ports;

receiving reports from the ports for each of the plurality of virtual subnetworks; and

upon receiving reports per query interval, forwarding up to a given number of reports to the legacy router.

9. The method of claim 8 further comprises suppressing reports after the given number of reports have been forwarded to the legacy router.

10. A method for providing multicast transmissions using a distributed router, the method comprises the steps of:

a) generating a routing table based on topology of virtual subnetworks;

b) generating a group affiliation table based on multicast group membership;

c) generating a multicast session table entry from the routing table and the group affiliation table when a data packet is detected for a group; and

d) establishing virtual connections based on the multicast session table entry to transport the data packet to members of the group.

11. The method of claim 10, wherein the topology of virtual subnetworks include at least one source virtual subnetwork and a plurality of destination virtual subnetworks.

12. The method of claim 10, wherein step (a) further comprises:

receiving a routing protocol message from a router associated with one of the virtual subnetworks;

interpreting the routing protocol message to determine ports coupled to downstream routers;

sending, via the ports, routing protocol messages to the downstream routers.

13. The method of claim 10 further comprises downloading the multicast session table entry to edge devices.

14. The method of claim 1, wherein step (c) further comprises:

generating the multicast session table entry to include ports that are coupled to at least one of: a legacy router supporting a member of the group and a host, wherein the host includes a computer that is a member of the group.

15. The method of claim 10, wherein step (b) further comprises:

providing a membership query to the virtual subnetworks;

receiving, via a port of a plurality of ports, a report in response to the membership query; and

suppressing forwarding of the report to other ports of the plurality of ports.

16. The method of claim 10 further comprises:

receiving a leave message via a port of a plurality of ports, wherein the leave message indicates that a member desires to leave the group;

providing a group specific membership query to the port; and

when a report is received in response to the group specific membership query, maintaining the port within the multicast group membership.

17. The method of claim 16 further comprises:

when a report is not received in response to the group specific membership query, determining whether at least one other port is supporting the group; and

when there are no other ports supporting the group, providing a leave message to a legacy router having query responsibilities.

18. The method of claim 10 further comprises:

receiving a leave message via a port of a plurality of ports; and

switching group affiliation of the port in accordance with the leave message.

19. The method of claim 10, wherein step (b) further comprises:

receiving a query from a legacy router;

forwarding the query to the virtual subnetworks, wherein edge devices support the plurality of virtual of subnetworks via ports;

receiving reports from the ports for each of the plurality of virtual subnetworks; and

upon receiving reports per query interval, forwarding up to a given number of reports to the legacy router.

20. The method of claim 19 further comprises suppressing reports after the given number of reports have been forwarded to the legacy router.

21. A distributed router comprises:

a processing module; and

memory operably coupled to the processing module, wherein the memory stores operational instructions that cause the processing module to (a) determine, for a source virtual subnetwork, a list of downstream virtual subnetworks for multicast traffic based on multicast routing protocol; (b) determine multicast group membership on a per downstream virtual subnetwork, edge device, and port basis; (c) receive a packet via the source virtual subnetwork; (d) upon receiving the packet, generate a multicast session table entry based on the list of downstream virtual subnetworks and the multicast group membership; (e) establish virtual connections between the source virtual subnetwork and edge devices coupled to virtual subnetworks identified in the list of downstream virtual subnetworks; and (f) download the multicast session table entry to the edge devices.

22. The distributed router of claim 21, wherein the memory further comprises operational instructions that cause the processing module to generate the multicast session table entry to include ports of the edge devices that are coupled to at least one of: a legacy router and a host.

23. The distributed router of claim 21, wherein the memory further comprises operational instructions that cause the processing module to determine the list of downstream virtual subnetworks by:

receiving a routing protocol message from a router associated with one of a plurality of virtual subnetworks, wherein the plurality of virtual subnetworks includes the source virtual subnetworks and the destination virtual subnetworks;

interpreting the routing protocol message to determine ports of the edge devices coupled to downstream routers;

sending, via the ports, routing protocol messages to the downstream routers.

24. The distributed router of claim 21, wherein the memory further comprises operational instructions that cause the processing module to determine the multicast group membership by:

providing a membership query on a virtual subnetwork;

receiving, via a port of one of the edge devices, a report in response to the membership query; and

suppressing forwarding of the report to other ports of the virtual subnetwork.

25. The distributed router of claim 21, wherein the memory further comprises operational instructions that cause the processing module to:

receive a leave message via a port of one of the edge devices, wherein the leave message indicates that a member desires to leave a multicast group;

provide a group specific membership query to the port of the one of the edge devices; and

when a report is received in response to the group specific membership query, maintaining the port of the one of the edge devices within the multicast group membership.

26. The distributed router of claim 25, wherein the memory further comprises operational instructions that cause the processing module to:

when a report is not received in response to the group specific membership query, determine whether at least one other port of a virtual subnetwork is supporting the multicast group; and

when there are no other ports of the virtual network supporting the multicast group, provide a leave message to a legacy router having query responsibilities.

27. The distributed router of claim 21, wherein the memory further comprises operational instructions that cause the processing module to:

receive a leave message via a port of one of the edge devices; and

switch group affiliation of the port of the one of the edge devices in accordance with the leave message.

28. The distributed router of claim 21, wherein the memory further comprises operational instructions that cause the processing module to determine the multicast group membership by:

receiving a query from a legacy router;

forwarding the query to a plurality of virtual subnetworks, wherein the edge devices support the plurality of virtual of subnetworks via ports;

receiving reports from the ports for each of the plurality of virtual subnetworks; and

upon receiving reports per query interval, forwarding up to a given number of reports to the legacy router.

29. The distributed router of claim 28, wherein the memory further comprises operational instructions that cause the processing module to suppress reports after the given number of reports have been forwarded to the legacy router.

30. A distributed router comprises:

a processing module; and

memory operably coupled to the processing module, wherein the memory stores operational instructions that cause the processing module to (a) generate a routing table based on topology of virtual subnetworks; (b) generate a group affiliation table based on multicast group membership; (c) generate a multicast session table entry from the routing table and the group affiliation table when a data packet is detected for a group; and (d) establish virtual connections based on the multicast session table entry to transport the data packet to members of the group.

31. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to generate the routing table by:

receiving a routing protocol message from a router associated with one of the virtual subnetworks;

interpreting the routing protocol message to determine ports coupled to downstream routers;

sending, via the ports, routing protocol messages to the downstream routers.

32. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to download the multicast session table entry to edge devices.

33. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to generate the multicast session table entry to include ports that are coupled to at least one of: a legacy router

supporting a member of the group and a host, wherein the host includes a computer that is a member of the group.

34. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to generate the group affiliation table by:

providing a membership query to the virtual subnetworks;

receiving, via a port of a plurality of ports, a report in response to the membership query; and

suppressing forwarding of the report to other ports of the plurality of ports.

35. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to:

receive a leave message via a port of a plurality of ports, wherein the leave message indicates that a member desires to leave the group;

provide a group specific membership query to the port; and

when a report is received in response to the group specific membership query, maintain the port within the multicast group membership.

36. The distributed router of claim 35, wherein the memory further comprises operational instructions that cause the processing module to:

when a report is not received in response to the group specific membership query, determine whether at least one other port is supporting the group; and

when there are no other ports supporting the group, provide a leave message to a legacy router having query responsibilities.

37. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to:

receive a leave message via a port of a plurality of ports; and

switch group affiliation of the port in accordance with the leave message.

38. The distributed router of claim 30, wherein the memory further comprises operational instructions that cause the processing module to generate the group affiliation table by:

receiving a query from a legacy router;

forwarding the query to the virtual subnetworks, wherein edge devices support the plurality of virtual of subnetworks via ports;

receiving reports from the ports for each of the plurality of virtual subnetworks; and

upon receiving reports per query interval, forwarding up to a given number of reports to the legacy router.

39. The distributed router of claim 38, wherein the memory further comprises operational instructions that cause the processing module to suppress reports after the given number of reports have been forwarded to the legacy router.